Claims

1. A Doppler velocity detection device for transmitting/receiving pulse waves to/from an object whose velocity is to be measured a plurality of times and, on the basis of received echo signals, analyzing the velocity of the object whose velocity is to be measured, wherein reception echo time-series signals obtained by arranging reception echo signals of equal lapse time from transmission times of pulses in order of the transmission times are expanded as components of a Legendre polynomial, and a velocity signal of the object whose velocity is to be measured is obtained on the basis of the magnitudes of expansion coefficients.

2. A Doppler velocity detection device according to claim 1, wherein an expansion coefficient of an even-numbered degree term and an expansion coefficient of an odd-numbered degree term which is different from the even-numbered degree term by one degree, derived when the reception echo time-series signals are expanded as components of a Legendre polynomial starting from the 0th degree, are linearly connected by using an imaginary unit as a coefficient, thereby obtaining a complex expansion coefficient and, on the basis of the ratio between the magnitude of each complex expansion coefficient and the magnitude of an interval between the complex expansion coefficients, a signed velocity signal is derived.

3. A Doppler velocity detection device comprising:

means for transmitting/receiving pulse waves to/from a subject a plurality of times; and

velocity analyzing means for analyzing a velocity of a moving reflector in the subject on the basis of a reception echo signal,

wherein the velocity analyzing means obtains a complex expansion coefficient by linearly connecting an expansion coefficient of an even-numbered degree term and an expansion coefficient of an odd-numbered degree term which is different from the even-numbered degree term by one degree, derived when reception echo time-series signals obtained by arranging reception echo signals of equal lapse time from pulse transmission times in order of the transmission times are expanded as components of a Legendre polynomial starting from the 0th degree, by using an imaginary unit as a coefficient, and obtains a signed velocity signal of a moving reflector in the subject on the basis of the ratio between the magnitude of each complex expansion coefficient and the magnitude of an interval between the complex expansion coefficients.

4. A Doppler velocity detection device according to claim 3, further comprising display means for two-dimensionally or three-dimensionally displaying a velocity signal of the moving

reflector together with an echo signal from a stationary reflector in the subject.

5. An ultrasonographic device comprising:

an ultrasonic probe;

means for allowing the ultrasonic probe to transmit/receive ultrasonic pulse waves to/from a subject a plurality of times; and

velocity analyzing means for analyzing velocity of a moving reflector in the subject on the basis of reception echo signals from the subject,

wherein the velocity analyzing means expands reception echo time-series signals obtained by arranging reception echo signals of equal lapse time from transmission times of the ultrasonic pulses in order of the transmission times as components of a Legendre polynomial, and obtains a velocity signal of a moving reflector in the subject on the basis of the magnitude of each of the expansion coefficients.

6. An ultrasonographic device according to claim 5, wherein the velocity analyzing means obtains a complex expansion coefficient by linearly connecting an expansion coefficient of an even-numbered degree term and an expansion coefficient of an odd-numbered degree term which is different from the even-numbered degree term by one degree, derived when the

reception echo time-series signals are expanded as components of a Legendre polynomial starting from the 0th degree, by using an imaginary unit as a coefficient, and obtains a signed velocity signal on the basis of the ratio between the magnitude of each complex expansion coefficient and the magnitude of an interval between the complex expansion coefficients.

7. An ultrasonographic device comprising:

an ultrasonic probe;

means for allowing the ultrasonic probe to transmit/receive ultrasonic pulse waves to/from a subject a plurality of times; and

velocity analyzing means for analyzing velocity of a blood flow in a moving organ in the subject on the basis of reception echo signals from the subject,

wherein the velocity analyzing means obtains a complex expansion coefficient by linearly connecting an expansion coefficient of an even-numbered degree term and an expansion coefficient of an odd-numbered degree term which is different from the even-numbered degree term by one degree, derived when the reception echo time-series signals obtained by arranging reception echo signals of equal lapse time from transmission times of the ultrasonic pulses in order of the transmission times are expanded as components of a Legendre polynomial starting from the 0th degree, by using an imaginary unit as

a coefficient, and obtains a signed velocity signal of the blood flow in the subject on the basis of the ratio between the magnitude of each complex expansion coefficient and the magnitude of an interval between the complex expansion coefficients.

8. An ultrasonographic device according to claim 7, further comprising display means for displaying a distribution image of a motion velocity of the organ or a spatial change in the motion velocity and a blood flow distribution image obtained simultaneously so as to be superimposed or arranged side by side.

9. An ultrasonographic device according to claim 7 or 8, wherein a blood flow having a velocity component of 3 mm/sec or higher toward the ultrasonic probe is detected and displayed while a motion velocity toward the ultrasonic probe of the organ changes by 1 mm/sec.

10. An ultrasonographic device comprising:

ultrasonic wave transmitting/receiving means for allowing a plurality of ultrasonic probes to transmit/receive an ultrasonic pulse to/from a subject a plurality of times;

a transmission beam former for controlling a transmission focal position of an ultrasonic pulse in the subject;

a reception beam former for controlling a reception focal

position in the subject;

a controller for controlling the ultrasonic wave transmitting/receiving means, the transmission beam former, and the reception beam former; and

velocity analyzing means for analyzing velocity of a moving reflector in the subject on the basis of reception echo signals from the subject,

wherein the velocity analyzing means obtains a complex expansion coefficient by linearly connecting an expansion coefficient of an even-numbered degree term and an expansion coefficient of an odd-numbered degree term which is different from the even-numbered degree term by one degree, derived when reception echo time-series signals obtained by arranging reception echo signals of equal lapse time from transmission times of the ultrasonic pulses in order of the transmission times are expanded as components of a Legendre polynomial starting from the 0th degree, by using an imaginary unit as a coefficient, and obtains a signed velocity signal of a moving reflector in the subject on the basis of the ratio between the magnitude of each complex expansion coefficient and the magnitude of an interval between the complex expansion coefficients.